

PCT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 28 May 2001 (28.05.01)	
International application No. PCT/SE00/01798	Applicant's or agent's file reference 112077 AM
International filing date (day/month/year) 15 September 2000 (15.09.00)	Priority date (day/month/year) 16 September 1999 (16.09.99)
Applicant ÖBERG, Peter	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
04 April 2001 (04.04.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

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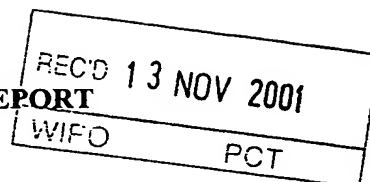
made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Claudio Borton Telephone No.: (41-22) 338.83.38
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference 112077 AM	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE00/01798	International filing date (day/month/year) 15.09.2000	Priority date (day/month/year) 16.09.1999
International Patent Classification (IPC) or national classification and IPC ₇ A47C 7/74, B60N 2/44, H05B 3/34		
Applicant Kongsberg Automotive AB et al		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>3</u> sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of _____ sheets.</p>
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>

Date of submission of the demand 04.04.2001	Date of completion of this report 05.11.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Dan Ionesco / MRo Telephone No. 08-782 25 00

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE00/01798

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language English which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☒ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE00/01798

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	<u>1-6</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-6</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-6</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The documents cited in the International Search Report represent the prior art. The claimed invention stated in claims 1 - 6 is not anticipated by these documents. None of the documents or any relevant combination of them reveals a method for production and application of heating elements for heating in vehicles as described by these claims.

According to the arguments stated above, the invention claimed in claims 1 - 6 is novel and considered to involve an inventive step. The industrial applicability of the claimed invention is obvious.

INTERNATIONAL SEARCH REPORT

International application No.:

PCT/SE 00/01798

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A47C 7/74, B60N 2/44, H05B 3/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A47C, B60N, H05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9409684 A1 (SCANDMEC AB), 11 May 1994 (11.05.94), page 13, line 27 - page 14, line 13; page 14, line 12 - line 27; page 3, line 20 - line 29, figures 1-7 --	
A	GB 2070400 A (NORTHERN BLANKETS LIMITED), 3 Sept 1981 (03.09.81), page 1, line 117 - line 125, figure 1 --	
A	US 4044221 A (G. KUHN), 23 August 1977 (23.08.77), abstract -- -----	

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

30 October 2000

Date of mailing of the international search report

31-10-2000

Name and mailing address of the ISA

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Dan Ionesco / JAn

Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

03/10/00

International application No.

PCT/SE 00/01798

WO	9409684	A1	11/05/94	AU	5401794	A	24/05/94
				DE	674488	T	29/08/96
				DE	69321253	D,T	27/05/99
				EP	0674488	A,B	04/10/95
				JP	8507404	T	06/08/96
				RU	2123772	C	20/12/98
				SE	501996	C	10/07/95
				SE	9203165	D	00/00/00
				SE	9302785	A	29/04/94

GB	2070400	A	03/09/81	AU	6794581	A	03/09/81
				BE	887654	A	15/06/81
				CA	1167507	A	15/05/84
				DE	3107011	A	24/12/81
				FR	2476467	A,B	28/08/81
				JP	56130096	A	12/10/81
				NL	8100978	A	16/09/81
				NZ	196352	A	18/11/83

US	4044221	A	23/08/77	SE	7508229	A	20/01/76
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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



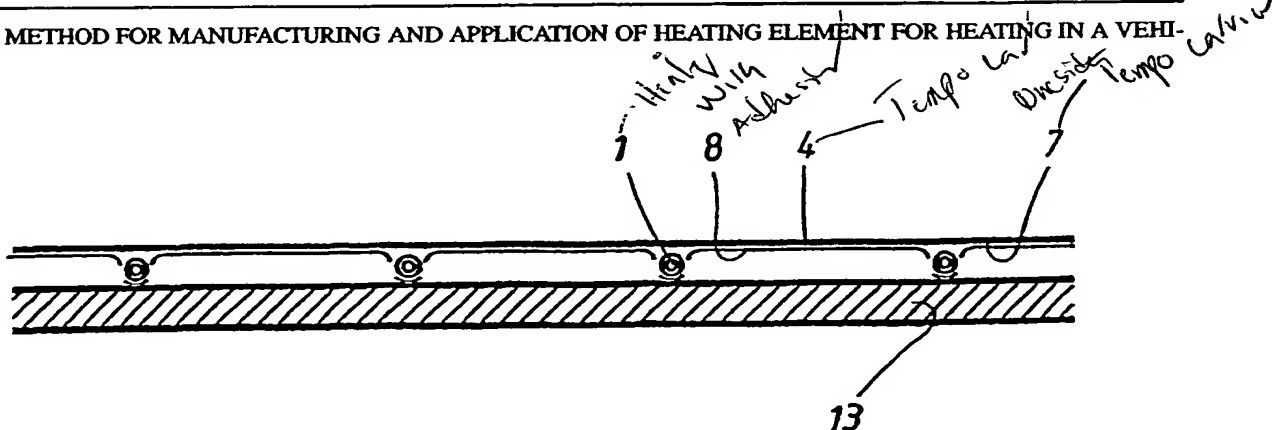
(43) International Publication Date
22 March 2001 (22.03.2001)

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(10) International Publication Number
WO 01/19220 A1

- (51) International Patent Classification⁷: A47C 7/74, (74) Agents: ANDERSSON, Per et al.; Albihns Patentbyrå
B60N 2/44, H05B 3/34 Göteborg AB, P.O. Box 142, S-401 22 Göteborg (SE).
- (21) International Application Number: PCT/SE00/01798 (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (22) International Filing Date:
15 September 2000 (15.09.2000)
- (25) Filing Language: Swedish
- (26) Publication Language: English (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (30) Priority Data:
9903324-3 16 September 1999 (16.09.1999) SE
- (71) Applicant (for all designated States except US): KONGSBERG AUTOMOTIVE AB [SE/SE]; Box 504, S-565 28 Mullsjö (SE).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): ÖBERG, Peter [SE/SE]; Skolvägen 21, S-560 42 Sandhem (SE).
- Published:
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR MANUFACTURING AND APPLICATION OF HEATING ELEMENT FOR HEATING IN A VEHICLE



(57) Abstract: A method for production and application of heating elements for heating in vehicles is described. The heating element consists of a heating wire (1) defining at least one electric heating loop extending, in its operating position, in a predetermined pattern. The heating wire (1) is positioned onto one side (7) of a temporary carrier (4). An adhesive (8) is applied over said carrier, and over the heating wire, causing the heating wire to adhere to the surface of the carrier. The carrier with the heating wire is then transported to a final substrate (13), which the heating element is to be in close contact with. The heating wire is pressed against the substrate, and the adhesive is activated so as to make the wire adhere to the substrate. The carrier is removed, so that the heating wire is released from the carrier and adheres to the substrate, to form the heating element for heating in the vehicle.

WO 01/19220 A1

3/pts

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TITLE

Method for manufacturing and application of heating element for heating in a vehicle

TECHNICAL FIELD

- 5 The present invention relates to a method for the production and application of a heating element for heating in vehicles, the heating element consisting of a heating wire defining at least one electric heating loop extending, in its operating position, in a predetermined pattern.

10 STATE OF THE ART

- It is previously known to produce heating elements for vehicles constructed from an electrically conducting heating loop that is applied onto a layer of material. Conventional heating elements are produced as separate products intended to allow rough handling, for example retrofitting into existing vehicle seats. The heating element
15 itself or the surrounding layers of material have had to function as a protective and carrying layer and have been given such a thickness that the heating elements have been noticeable to the user, due to stiffness as well as level differences in the seat around the edges of the element. Further, the increasing cost hunt on vehicle components has raised the demand for low manufacturing costs, with regard to material
20 as well as mounting costs.

- The object of the present invention is to provide a method for the production and application of a heating element for vehicles that solves the problems discussed above in such a way that for example vehicles can be equipped with heating elements at a very limited additional cost, enhancing the driving comfort.
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DISCLOSURE OF INVENTION

Said object is achieved by means of a method characterised by the steps of:

- positioning the heating wire onto at least one side of a temporary carrier,
30 applying an adhesive over said carrier, at least over those areas where the heating wire is lying on the carrier, and over the heating wire, causing the heating wire to adhere to the surface of the carrier,
transporting the carrier with the heating wire to a final substrate, which the heating element is to be in close contact with,

pressing the heating wire against the substrate, heating the adhesive so as to make the wire adhere to the substrate, and

removing the carrier, so that the heating wire is released from the carrier and adheres to the substrate, to form the heating element for heating in the vehicle.

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DESCRIPTION OF DRAWINGS

The invention will be described in further detail below, by way of an embodiment example, with reference to the enclosed drawings, of which

Fig. 1 is a top view, schematically illustrating the construction of one example of a heating element for use with the method according to the invention,

Fig. 2 shows a partially broken section, in an enlarged scale, of the heating element during a manufacturing stage,

Figs. 3-5 shows the corresponding section during an application stage, and

Fig. 6 is a cross-section through a vehicle seat with a heating element during the manufacturing process for the complete seat.

10 PREFERRED EMBODIMENT

The basic thought of the present invention is to provide a heating element with as simple a construction as possible, and to limit the handling stages and handling times of the element before fitting it into its final location, e.g. in a vehicle seat.

Through this, the demands for easy handling of the mechanical construction of the element before fitting can be lowered, thus reducing the additional cost of providing a vehicle with heating elements. The heating element is thus intended for heating in a vehicle, the power source commonly being the vehicle generator and battery. The heating element is generally intended for heating a vehicle seat, for example its bottom, backrest or headrest, in order not to chill the vehicle driver or passenger.

20 The heating element can also be arranged at other locations in the vehicle passenger compartment, for example in armrests panels, floor, door panels and roof, in order to maintain a warm and comfortable environment.

25 The active component of the heating element is a heating wire 1, normally consisting of metal or carbon fibre, or being spun from filaments with different properties. The heating wire 1 is of the electrical resistance wire type, that is, a wire developing heat due to its high resistance when passed by an electric current, said current in

turn being obtained through two feeder lines 2, 3 that may or may not be insulated, connected to a (not shown) electric power source and, in a handling stage to be described in further detail below, applied through gluing onto a flexible carrier 4, as hinted by dot-dashed lines in Fig. 1. The carrier may be paper or a plastic film, and, preferably, as such electrically non-conductive.

The resistance wire is made with an appropriately adapted resistance for generating heat during application of a voltage across the terminal ends 5, 6 of the wire through the feeder lines 2, 3. The resistance is chosen by selecting the values of various parameters, such as the wire material resistivity, the wire diameter and its length. The wire may be uninsulated, or insulated with a conventional insulating material. The method according to the invention will now be described, with reference to Figs. 2, 3, 4, 5 and 6. The carrier 4 mentioned above, during rational production, is produced as a continuous web, uncoiled from a not shown roll and conveyed through a plant for producing heating elements. The transportation medium may consist of a not shown conveyor in the form of an endless conveyor belt, supporting the carrier and feeding it, either step-wise or continuously, through various stations in the manufacturing process. Initially, the heating wire 1 is applied, likewise being uncoiled from a not shown roll and applied into its predetermined pattern to form the active component of the heating element. The positioning is e.g. made by winding the wire around a number of fixed nails or pins defining a positioning fixture for the wire. This could be made either manually, or automatically by means of a robot. The "small" sinus shape, i.e. the serpentine shape superimposed upon the major serpentine shape, is preferably selected for absorbing the load from e.g. a person in a vehicle seat and allow stretching of the heating wire. This smaller sinus shape is preferably preformed in an earlier stage. Another serpentine shape is of course conceivable. As can be gathered from Fig. 2, the wire is positioned practically in contact with the carrier 4.

Fig. 2 hereby illustrates a schematic cross-section through the carrier and thus cross-sections through some loop portions of the heating wire 1. At a station 21 for application of adhesive, shown in Fig. 2, the chemical bonding agent is applied, preferably in the form of a spray glue, through spraying of preferably the entire carrier surface, more specifically the topside 7 thereof, or at least those portions of the

carrier where the heating wire 1 extends. The spray glue 8 is supplied from a number of not shown nozzles above the carrier and the heating wire. Through the carrier 4 advantageously having certain absorbing properties, the spray glue will penetrate almost entirely into the carrier material, and thus will not form any strongly adhesive surface coating upon the carrier. On the other hand, an adhesive layer 9 or glue layer will be applied onto the heating wire 1, over its entire length on the carrier 4. The glue is of the thermo-glue type, whereby the glue in the nozzles and during application onto the heating wire is kept heated to a temperature above the glue melting temperature, entailing that the glue will be in liquid form or at least have adhesive properties. In practice, the glue outside of the nozzles will transform into filaments, settling like a "spun" surface across the heating wire 1 and the topside 7 of the carrier 4. Either the entire topside, or selected areas along the wire loop can be coated. The glue is applied in such a quantity that it will settle also in an area 10, 11 between the heating wire 1 and the carrier 4 on both sides of the wire, and will practically flow in under the wire. Hereby, the adhesive or glue will provide an attachment between the heating wire 1 and the carrier. As the carrier with the heating wire is subsequently conveyed to an area with a temperature below the melting point of the glue, in the case of thermo-glue, the glue will harden and form an efficient attachment of the heating wire 1 in its determined position or distribution relative to the carrier 4.

After a completed application and attachment of the heating wire to the carrier 4 in the manner described above, the carrier 4 may, at the final end of the machine, be wound up into a roll for further transportation e.g. to the subsequent intermediate user or end user. As an alternative, the carrier and heating wire could be cut transversally into predetermined units, e.g. into the rectangular shape indicated by a dot-dashed line in Fig. 1. The heating wire may thereby have such an extension as to run continuously across from one carrier unit to another for a rational production, and the wire would then be cut in the same step as the transversal cutting of the carrier 4. The web material would then either have the same width as the final width of the carrier, or two or more carriers might be arranged side by side, whereby longitudinal cutting would also be performed at a suitable stage. The carrier 4 is, however, according to the invention, only a temporary carrier or transportation carrier, intended for upholding the shape and location of the heating wire 1 and enable its

handling before being given its final location in an intermediate product or an end product.

Fig. 3 illustrates a later stage in the handling of the heating element according to the method of the invention. This stage may be a later stage in a continuous process in one and the same machine described above, but may also be a handling stage at an intermediate user's or an end user's. Common for the different cases is that the heating element is to be placed onto a substrate 13, defining some kind of a covering layer inside a vehicle, preferably in a vehicle passenger compartment. This substrate 13 could be a textile upholstery layer defining the upholstery of a vehicle seat. The upholstery layer may hereby for example be provided with the heating element already at an upholstery manufacturer, who will supply the upholstery layer equipped with a heating element. Alternatively, the heating element may be applied to the upholstery layer in connection with the production of a vehicle seat, to be described further below. With the term substrate is meant a base surface, not necessarily located below the heating element but just as well a side surface or a surface turned downwards, such as a ceiling.

The carrier thus functions as a temporary carrier for storage and transportation of the heating element and for application of the heating element onto the substrate. By substrates turned upwards, such as in Fig. 3, the carrier is positioned upside down in relation to the stage according to Fig. 2, the heating wire being located on the bottom side of the carrier. The carrier is either handled unit-wise, for example manually, by being positioned, with the heating wire 1 turned downwards, against the substrate 13, that is, the topside 14 thereof. The carrier with the heating wire is advantageously applied to the substrate 13 using a certain pressure, e.g. with weights. The adhesion of the heating wire 1 will take place by heating the heating wire 1 as well as the substrate 13 to a temperature above the melting temperature of the thermo-glue, entailing that the thermo-glue will melt so as to be activated into adhesion, affixing the heating wire to the substrate. The heating is obtained by the heating wire 1 already at this stage advantageously being connected to the feeder lines 2, 3, which in turn are connected to a connector means 23 (see Fig. 1). Via the connector means, the heating element is connected to an electric power source, causing an electric current to flow through the heating wire. Said current is of such

strength as to cause the heating described above. As illustrated schematically in Fig. 4, the heating and the melting of the glue entails, that the glue surface at the heating wire 1 is parted, reducing the adhesion of the carrier 4 to the wire. The melting of the glue thus entails that the carrier 4, after removal of the weights, can be lifted off, separating the heating wire 1 from the carrier and leaving it on the substrate. The current supply is then interrupted, e.g. through disconnecting the connector means 23 from the voltage source, whereupon the heating wire will cool down to a temperature below the melting temperature of the glue. This leads to the glue achieving full adhesive action against the topside 14 of the substrate 13.

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It may be gathered from Fig. 4, that the glue on the envelope surface of the heating wire is substantially missing over that portion of its circumference where it is least needed, that is at the portion of the circumference directed away from the substrate 13. This may however be more or less evident. This entails that, at a stage after the described application stage, the transport carrier 4 can be removed, preferably starting from one edge 15 of the carrier, by lifting it off the wire and the substrate. The heating wire thereby remains on the substrate and the carrier can be removed completely, see Fig. 5. The glue will then be concentrated onto exactly those portions where it is to function as an adhesive, i.e. between the heating wire 1 and the substrate 13.

20

The manufacture of a vehicle seat with a heating element will now be described by way of an example, with reference to Fig. 6. The method according to the invention can be used by that type of vehicle seat manufacture where the filling or core forming the resilient comfort-providing carrier for the upholstery material is not formed before applying of the upholstery onto the finished core, but is formed by means of filling expanding cold foam, e.g. polyurethane foam, into a mould 16, to form the comfort-providing, resilient core 17.

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The upholstery material 13 is initially placed into the mould 16 with its outside, made e.g. of a textile layer 18, turned towards the wall 19 of the mould. The upholstery material may, besides the textile material, comprise an internal layer 20 of e.g. polyurethane film, fixedly applied directly onto the fabric layer or onto an intermediate foam material. The upholstery material 13 is produced and finished in an earlier

30

stage, through for example flame lamination or gluing. The heating element according to the invention may, in a previous stage, e.g. by a supplier of upholstery material, be applied to the inside of the upholstery material, that is against its internal layer 20, or may be placed into the mould 16 against the upholstery material in a separate stage.

If the heating element has not been applied before, the transfer and adhesion of the heating element, i.e. the heating wire, is performed in the manner described above, the upholstery material thus defining the substrate 13. In the illustrated example, the layer 20 and the glue may be of the same material, e.g. polyamide, polyurethane, or similar. Hereby, the heating loop is affixed to the upholstery material 14.

The heating element is then completely oriented and affixed in relation to the upholstery material, whereupon the core 13 is created through filling of the cold foam 13, the foam then expanding in a fermentation process and entirely filling the interior of the mould and being connected to the inner layer 9 of the upholstery material, said layer also being of the same material as the foam material, i.e. polyurethane. The layer 9 furthermore prevents the expanding foam from penetrating into and through the upholstery material.

The vehicle seat in question or, more specifically, one part thereof, is thus substantially ready after cutting it clean and applying a backside layer, if any. It is not shown in the figure, but already in connection with its application, the heating element will be provided with the feeder lines, extending between the upholstery material and the core, as well as with said electrical connector means for connection to a not shown control unit for control of the power supplied from the vehicle voltage source.

The invention will not be limited to the embodiments described above and illustrated in the drawings, but can be varied within the scope of the appended claims. It will be understood that the heating wire is in close contact with the temporary carrier 4 as well as the upholstery and the core even if, for the sake of clarity, the various components are shown with intermediate distances. As mentioned above, the heating element can be fitted to other substrates in the vehicle, e.g. panels, roof, instrument

panel, etc. When fitting in vehicle seats, other methods than the one described for seats could be used.

CLAIMS

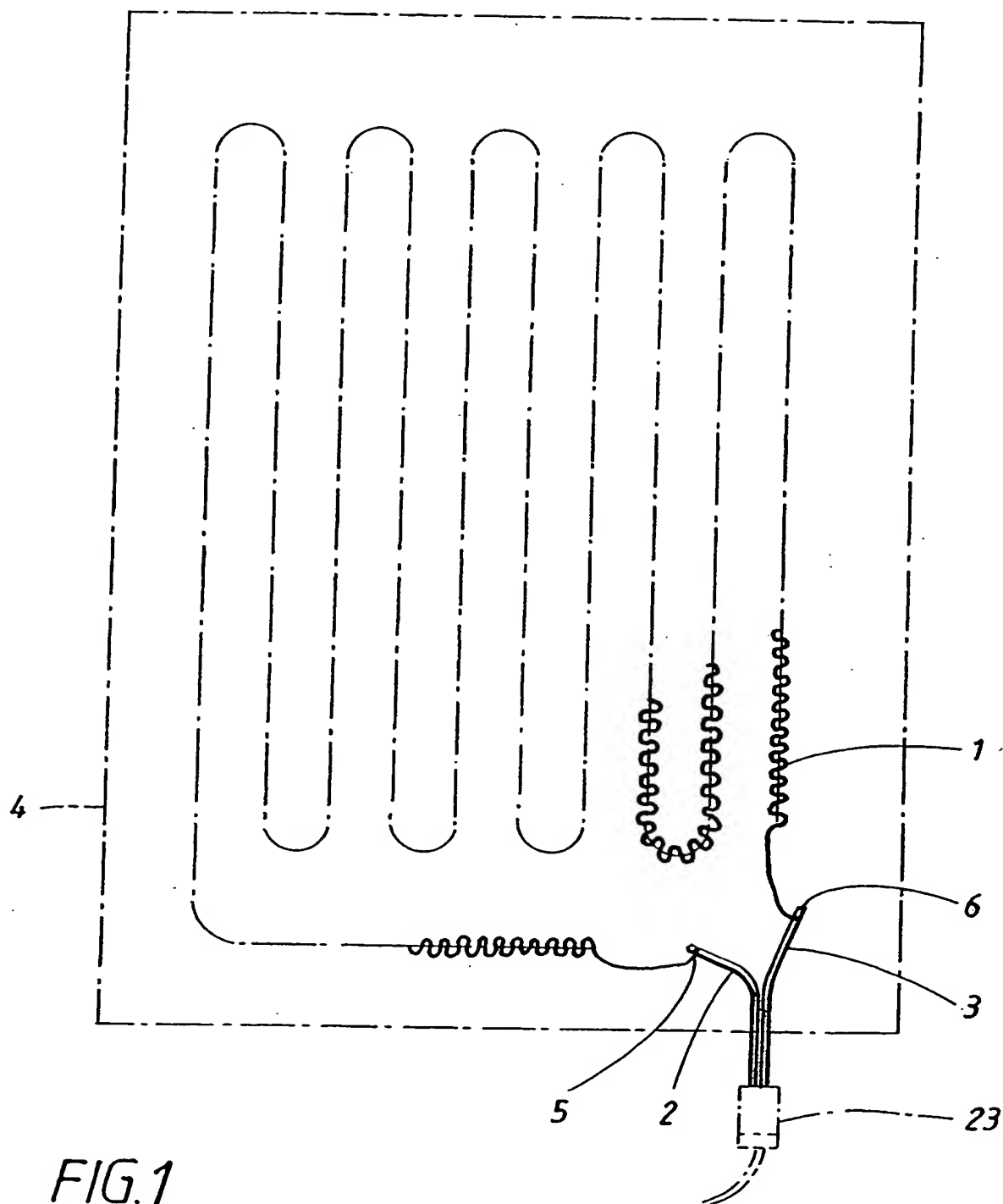
1. A method for production and application of heating elements for heating in vehicles, said heating element consisting of a heating wire (1) defining at least one electric heating loop extending, in its operating position, in a predetermined pattern, c h a r a c t e r i s e d b y the steps of:
- 5
- positioning the heating wire (1) onto at least one side (7) of a temporary carrier (4),
- 10
- applying an adhesive (8) over said carrier, at least over those areas where the heating wire is lying on the carrier, and over the heating wire, causing the heating wire to adhere to the surface of the carrier,
- 15
- transporting the carrier (4) with the heating wire to a final substrate, which the heating element is to be in close contact with,
- pressing the heating wire against the substrate, heating the adhesive so as to make the wire adhere to the substrate, and
- 20
- removing the carrier, so that the heating wire is released from the carrier and adheres to the substrate, to form the heating element for heating in the vehicle.
2. The method according to claim 1, c h a r a c t e r i s e d b y the adhesive being applied through spraying across the heating wire and the carrier surface on that side thereof where the heating wire (1) is located.
- 25
3. The method according to claim 2, c h a r a c t e r i s e d b y the carrier absorbing the adhesive (8) so that the carrier surface (7) will only obtain negligible adhesive ability.
- 30
4. The method according to claim 1 wherein the adhesive is a thermo-glue, c h a r a c t e r i s e d b y the thermo-glue being heated and maintained at a temperature above the melting point of the thermo-glue when the thermo-glue is

applied onto the heating wire (1) and the carrier (4) as well as when the wires have been applied onto the substrate (13).

5 5. The method according to claim 4, characterised by said heating being obtained through the supply of electric current through the heating wire (1).

10 6. The method according to claim 5, characterised by the supply of electric current being achieved through connecting the heating wire (1) to an electric power source via one or more electrical connector means (31), intended for connection of the heating element to the vehicle voltage source when in the final operating position in the vehicle.

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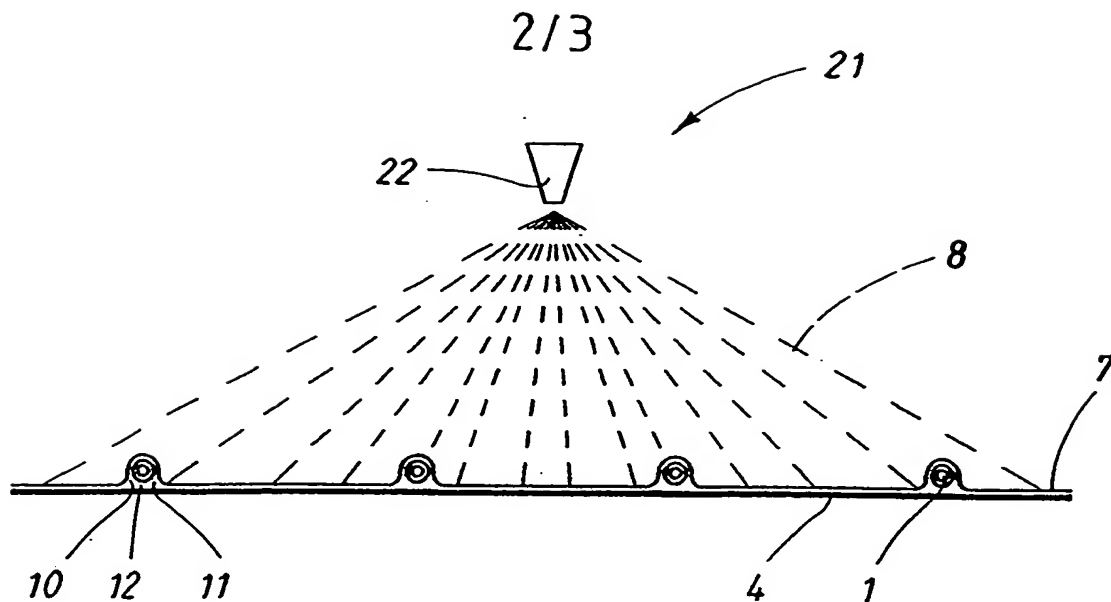


FIG. 2

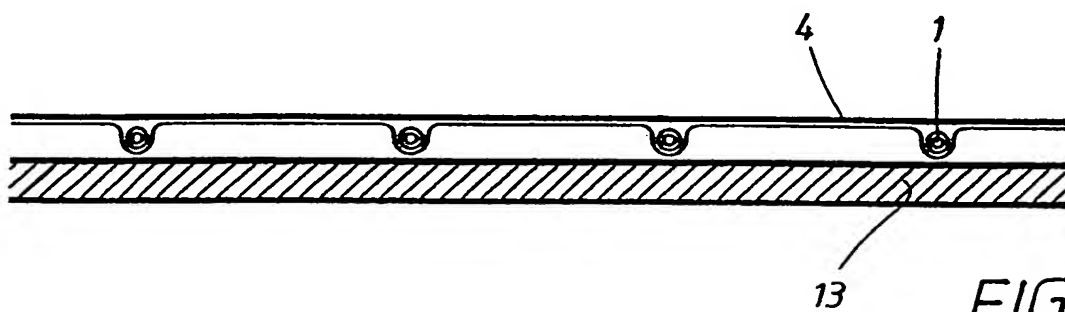


FIG. 3

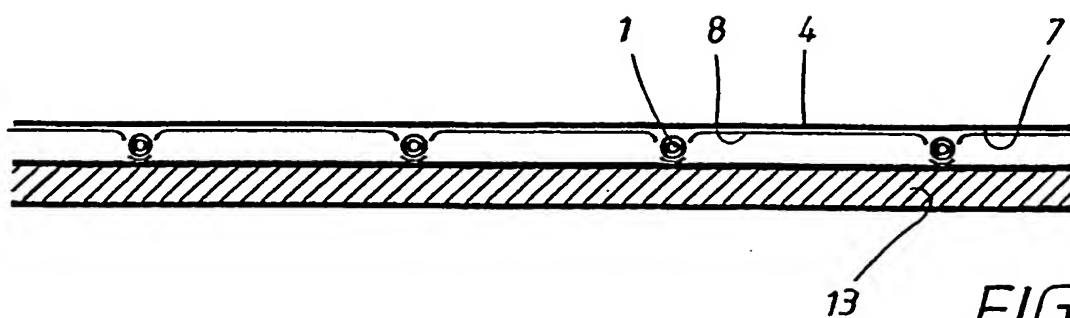


FIG. 4

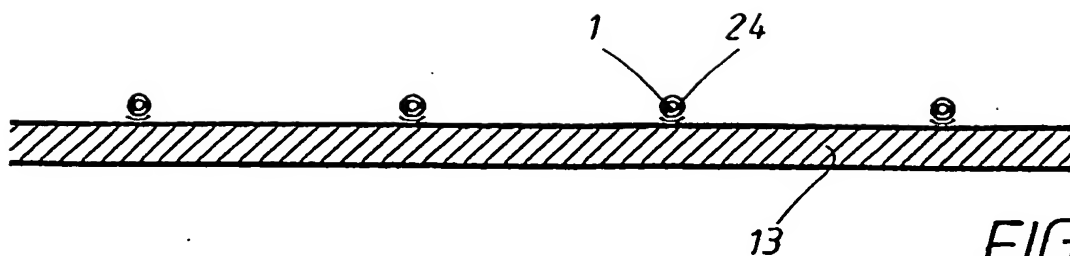
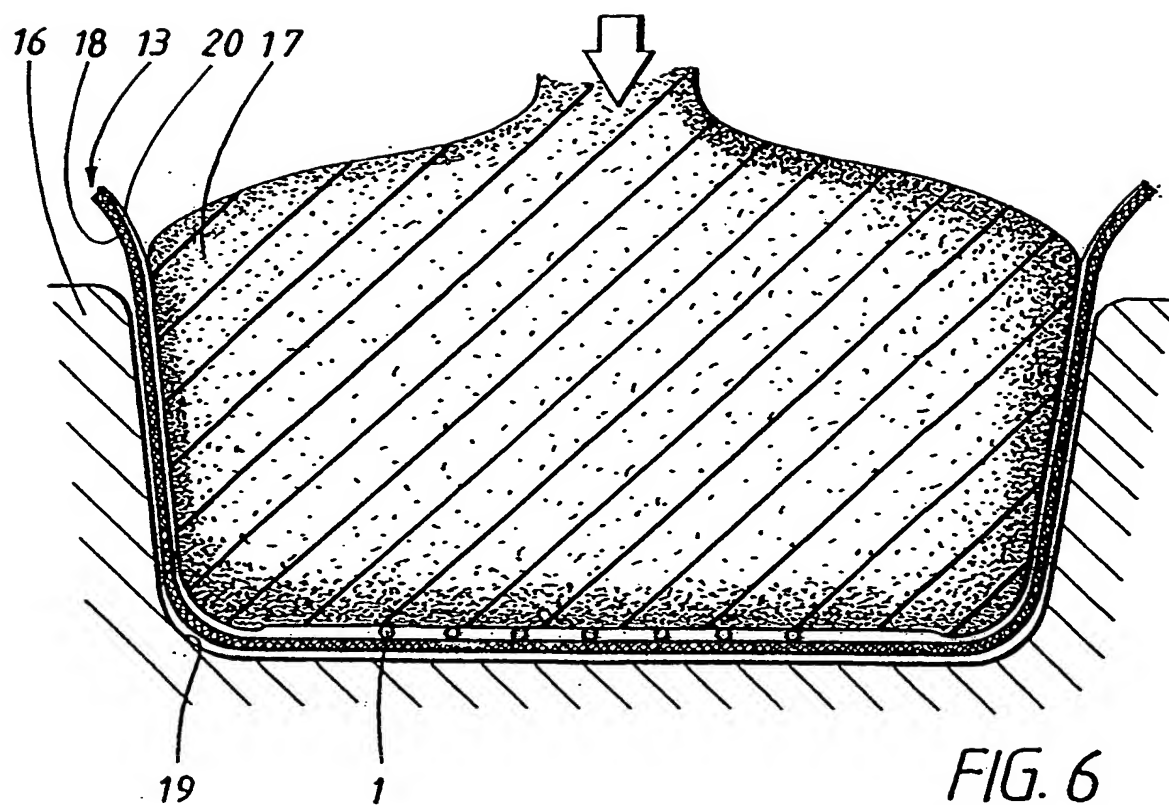


FIG. 5

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/01798

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A47C 7/74, B60N 2/44, H05B 3/34
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A47C, B60N, H05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9409684 A1 (SCANDMEC AB), 11 May 1994 (11.05.94), page 13, line 27 - page 14, line 13; page 14, line 12 - line 27; page 3, line 20 - line 29, figures 1-7 --	
A	GB 2070400 A (NORTHERN BLANKETS LIMITED), 3 Sept 1981 (03.09.81), page 1, line 117 - line 125, figure 1 --	
A	US 4044221 A (G. KUHN), 23 August 1977 (23.08.77), abstract -- -----	

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents

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T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

Z document member of the same patent family

Date of the actual completion of the international search

30 October 2000

Date of mailing of the international search report

31-10-2000

Name and mailing address of the ISA
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer
Dan Ionesco / JAn
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT
Information on patent family members

03/10/00

International application No.
PCT/SE 00/01798

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